DIGITALLY CONTROLLED OPTICAL FIBER DELAY LINE

ABSTRACT OF THE DISCLOSURE

An optical fiber delay line includes: multiple differential delay lines; and multiple switchers connecting the differential delay lines in pairs. Using, for example, N+1 differential delay lines numbered by k from 0 to N, the k-th differential delay line delays an input optical signal by an amount of time $(t^k_A - t^k_B) = 2^k \tau$, so that the electronically controlled switchers allow digitally controlling the delay over a range from 0 to $(2^{N+1} - 1)\tau$ with a time resolution of τ. The delay line can also be used simultaneously as a phase modulator, enabling a system of synchronization that can be realized entirely electronically and may be very useful in the case of large fiber arrays comprising a number of fiber modules such as beam splitters, fiber amplifiers, connectors, and collimators. The delay line can also be used as a commutator, for controlled switching of optical signals between channels.